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In the "method of functional equations" Professor Carmichael makes use of rational solutions of certain types of Diophantine problems of importance in the work of Diophantus itself. A general systematic development of this method is not attempted.

Chapters III and IV, on the equations of the third and fourth degrees, are very valuable in giving in elegant form the principal results so far obtained in this field. Professor Carmichael has done good service in collecting and arranging not only his own researches but the results of the labor of others as well. A short account is given in Chapter V of certain higher equations, ending with a very complete statement of our knowledge regarding Fermat's Last Theorem.

Professor Carmichael has omitted entirely the theory of binary quadratic forms and has made no use of the theory of continued fractions. This has resulted in some rather unsightly patches in the book. The discussion of the equation $x^2 - Dy^2 = z^2$ makes the author almost as much trouble, and takes up almost as much space as a straightforward discussion of the continued fraction representing a quadratic surd would require.

The book will serve a valuable end in stimulating interest in this delightful branch of mathematics. There are many interesting and suggestive problems at the end of each chapter, some of which are excellent material for further research.

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PROBLEMS AND SOLUTIONS.

EDITED BY B. F. FINKEL AND R. P. BAKER.

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PROBLEMS FOR SOLUTION.

ALGEBRA.

457. Proposed by FRANK IRWIN, University of California.

If a be any number prime to m and m/a be developed as a continued fraction,

$$\frac{m}{a} = a_1 + \frac{1}{a_2} + \frac{1}{a_3} + \cdots + \frac{1}{a_{k-1}} + \frac{1}{a_k},$$

with $a_1 \neq 0$, then there will exist a number b such that $m/b = a_k + 1/a_{k-1} + \cdots + 1/a_2 + 1/a_1$. Show that $ab \equiv \pm 1 \pmod{m}$ and determine the sign.

458. Proposed by CLIFFORD N. MILLS, Brookings, South Dakota.

Show that n terms of the series $1 + 3 + 4 + 6 + 7 + 9 + 10 + \cdots$ is $\frac{1}{4}(n+1)(3n-1)$ when n is odd, and $n/2[(3n/2) + 1]$ when n is even.

459. Proposed by C. N. SCHMALL, New York City.

By d'Alembert's test, or otherwise, show that in the infinite series

$$x + \frac{2^2 x^2}{2!} + \frac{3^3 x^3}{3!} + \frac{4^4 x^4}{4!} + \cdots + \frac{n^n x^n}{n!} + \cdots$$

the upper limit of the interval of convergence is $1/e$ where e is the Naperian base, i. e., $x < 1/e$ when the series is convergent. (Bromwich's *Infinite Series*, pp. 28, 33.)